

# SEQUENCE LISTING

<110> Famodu, Layo O.  
Orozco, Buddy  
Rafalski, Antoni

<120> Plant Aminoacyl-tRNA Synthetase

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<151> July 15, 1998

<160> 29

<170> Microsoft Office 97

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Gln Gln Gln Gln Gln Pro Ala Asp Ala Glu Asp Pro Phe Ala Ala Asn
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Tyr Gly Glu Val Pro Val Glu Glu Ile Gln Ser Lys Ala Ile Ser Gly
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Arg Ser Trp Ser His Val Gly Asp Leu Asp Asp Ser Ala Ala Gly Arg
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Ser Val Leu Ile Arg Gly Ala Ala Gln Ala Ile Arg Pro Val Ser Lys
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Lys Met Ala Phe Val Val Leu Arg Gln Ser Met Ser Thr Val Gln Cys
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Ile Gln Val Arg Lys Ile Tyr Cys Ile Asn Arg Ala Ile Pro Thr Leu
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Ala Glu Leu Ala Gly Glu Lys Leu Val Arg Val Gly Gln Asp Thr Arg
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Leu Asn Tyr Arg Ala Ile Asp Leu Arg Thr Pro Ser Asn Gln Ala Ile
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Ser Glu Gly Gly Ala Ala Val Phe Lys Leu Leu Tyr Asn Gly Gln Pro
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Glu Met Glu Ile Lys Glu His Tyr Phe Glu Val Cys Asp Ile Ile Asp  
 340 345 350

Gly Leu Phe Val Ser Ile Phe Lys His Leu Ser Glu Asn Cys Lys Lys  
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Glu Leu Glu Ser Ile Asn Arg Gln Tyr Pro Phe Glu Pro Leu Lys Tyr  
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Ala Glu Lys Lys Leu Gly Arg Leu Val Arg Glu Lys Tyr Asp Thr Asp  
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Phe Phe Ile Leu Tyr Arg Tyr Pro Leu Ala Val Arg Pro Phe Tyr Thr  
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Gly Phe Gly Val Gly Leu Glu Arg Val Val Met Leu Phe Cys Ala Leu  
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Val Pro  
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 <213> Oryza sativa

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 <213> Oryza sativa

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 35 40 45  
 Tyr Thr Met Pro Cys Tyr Asp Asn Pro Ala Tyr Ser Asn Ser Phe Asp  
 50 55 60  
 Val Phe Ile Arg Gly Glu Glu Ile Ile Ser Gly Ala Gln Arg Ile His  
 65 70 75 80  
 Leu Pro Glu Leu Leu Thr Lys Arg Ala Thr Glu Cys Gly Ile Asp Ala  
 85 90 95  
 Ser Thr Ile Ser Ser Tyr Ile Glu Ser Phe Ser Tyr Gly Ala Pro Pro  
 100 105 110  
 His Gly Gly Phe Gly Val Gly Leu Glu Arg Val Val Met Leu Phe Cys  
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 Arg Leu Val Pro  
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Leu Ser Arg Glu Ser Ile Val Asp Val Glu Gly Val Val Ser Ile Pro
 35          40          45

Ser Ala Pro Ile Lys Gly Ala Thr Gln Gln Val Glu Ile Gln Val Arg
 50          55          60

Lys Leu Tyr Cys Val Ser Arg Ala Val Pro Thr Leu Pro Ile Asn Leu
 65          70          75          80

Glu Asp Ala Ala Arg Ser Glu Val Glu Ile Glu Thr Ala Leu Gln Ala
 85          90          95

Gly Glu Gln Leu Val Arg Val Asn Gln Asp Thr Arg Leu Asn Phe Arg
100          105          110

Val Leu Asp Val Arg Thr Pro Ala Asn Gln Gly Ile Phe Arg Ile Gln
115          120          125

Ser Gln Val Gly Asn Ala Phe Arg Gln Phe Leu Leu Ser Glu Gly Phe
130          135          140

Cys Glu Ile His Thr Pro Lys Leu Ile Ala Gly Ser Ser Glu Gly Gly
145          150          155          160

Ala Ala Val Phe Arg Leu Asp Tyr Lys Gly Gln Pro Ala Cys Leu Ala
165          170          175

Gln Ser Pro Gln Leu His Lys Gln Met Ser Ile Cys Gly Asp Phe Gly
180          185          190

Arg Val Phe Glu Ile Gly Pro Val Phe Arg Ala Glu Asp Ser Tyr Thr
195          200          205

His Arg His Leu Cys Glu Phe Thr Gly Leu Asp Val Glu Met Glu Ile
210          215          220

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Lys Lys His Tyr Phe Glu Val Met Asp Ile Val Asp Arg Leu Phe Val  
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 His Arg Tyr Pro Leu Ala Val Arg Pro Phe Tyr Thr Met Pro Cys Tyr  
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Pro Ala Tyr Leu Ala Gln Ser Leu Gln Ser Tyr Lys Gln Met Ser Ile  
35 40 45

Cys Gly Gly Phe Gly Arg Val Phe Glu Ala Gly Pro Val Phe Arg Ser  
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Glu Lys Ser Asn Thr His Arg His Leu Cys Glu Phe Ile Gly Leu Asp  
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Asp Cys

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<213> Zea mays

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Ser	Asp	Val	Asn	His	Ser	Asp	Gln	Ala	Leu	Glu	Ile	Ala	Ser	Asp	Arg		
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Val	Tyr	Tyr	Ile	Tyr	Gln	Thr	Leu	Tyr	Asp	Cys	Glu	Glu	Val	Leu	Ala		
385					390					395					400		
Thr	Tyr	Arg	Glu	Glu	Gly	Thr	Ser	Leu	Pro	Val	Pro	Ser	Glu	Glu	Gln		
				405					410						415		
Asn	Leu	Ile	Gly	Lys	His	His	Ser	Glu	Phe	Leu	Lys	His	Met	Ser	Asn		
			420					425					430				
Asp	Leu	Lys	Thr	Thr	Asp	Val	Leu	Asp	Arg	Cys	Phe	Met	Glu	Leu	Leu		
		435					440					445					
Lys	Ala	Ile	Asn	Ser	Ser	Leu	Asn	Asp	Leu	Lys	Lys	Leu	Gln	Gln	Lys		
	450					455					460						
Ile	Glu	Gln	Gln	Lys	Lys	Lys	Gln	Gln	Gln	Gln	Lys	Lys	Gln	Gln	Gln		
465					470					475					480		
Gln	Lys	Gln	Gln	Gln	Gln	Lys	Gln	Gln	Gln	Leu	Gln	Lys	Gln	Pro	Glu		
				485					490					495			
Asp	Tyr	Ile	Gln	Ala	Leu	Ile	Ala	Leu	Glu	Thr	Glu	Leu	Lys	Asn	Lys		
			500					505					510				
Leu	Ser	Ile	Leu	Gly	Leu	Met	Pro	Ser	Ser	Ser	Leu	Ala	Glu	Val	Leu		
		515					520					525					
Lys	Gln	Leu	Lys	Asp	Lys	Ser	Leu	Lys	Arg	Ala	Gly	Leu	Thr	Glu	Glu		
	530					535					540						
Gln	Leu	Gln	Glu	Gln	Ile	Glu	Gln	Arg	Asn	Val	Ala	Arg	Lys	Asn	Lys		
545					550					555					560		
Gln	Phe	Glu	Ile	Ser	Asp	Gly	Ile	Arg	Lys	Asn	Leu	Ala	Thr	Lys	Gly		
				565					570					575			
Ile	Ala	Leu	Met	Asp	Glu	Pro	Ser	Gly	Thr	Val	Trp	Arg	Pro	Cys	Glu		
			580					585					590				
Pro	Glu	Arg	Ser	Glu	Glu	Ser											
		595															

<210> 11  
 <211> 1957  
 <212> DNA  
 <213> Oryza sativa

<400> 11  
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 agaaggagct cttcgagccg cttgtggagg ggaagggtccg catgtatgtg tgcggcgctca 180  
 cgccctacga cttcagccac atcggccacg cccgcgccta cgtcgccttc gacgtctctt 240  
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 atacaagaaa gcggaaccct gcagactttg cgctgtggaa ggctgctaag gaaggcgaac 660  
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 caaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaa 1957

<210> 12  
 <211> 548  
 <212> PRT  
 <213> Oryza sativa

<400> 12  
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 20 25 30  
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 35 40 45  
 Glu Gly Lys Val Arg Met Tyr Val Cys Gly Val Thr Pro Tyr Asp Phe  
 50 55 60

Ser	His	Ile	Gly	His	Ala	Arg	Ala	Tyr	Val	Ala	Phe	Asp	Val	Leu	Tyr	
65					70					75					80	
Arg	Tyr	Leu	Lys	Phe	Leu	Gly	Tyr	Glu	Val	Glu	Tyr	Val	Arg	Asn	Phe	
				85					90					95		
Thr	Asp	Ile	Asp	Asp	Lys	Ile	Ile	Lys	Arg	Ala	Asn	Glu	Ala	Gly	Glu	
			100					105					110			
Thr	Val	Thr	Ser	Leu	Ser	Ser	Arg	Phe	Ile	Asn	Glu	Phe	Leu	Leu	Asp	
		115					120					125				
Met	Ala	Gln	Leu	Gln	Cys	Leu	Pro	Pro	Thr	Cys	Glu	Pro	Arg	Val	Thr	
	130					135					140					
Asp	His	Ile	Glu	His	Ile	Ile	Glu	Leu	Ile	Thr	Lys	Ile	Met	Glu	Asn	
145					150					155					160	
Gly	Lys	Ala	Tyr	Ala	Met	Glu	Gly	Asp	Val	Tyr	Phe	Ser	Val	Asp	Thr	
				165					170					175		
Phe	Pro	Glu	Tyr	Leu	Ser	Leu	Ser	Gly	Arg	Lys	Leu	Asp	His	Asn	Leu	
			180					185					190			
Ala	Gly	Ser	Arg	Val	Ala	Val	Asp	Thr	Arg	Lys	Arg	Asn	Pro	Ala	Asp	
		195					200					205				
Phe	Ala	Leu	Trp	Lys	Ala	Ala	Lys	Glu	Gly	Glu	Pro	Phe	Trp	Asp	Ser	
	210					215					220					
Pro	Trp	Gly	Arg	Gly	Arg	Pro	Gly	Trp	His	Ile	Glu	Cys	Ser	Ala	Met	
225					230					235					240	
Ser	Ala	His	Tyr	Leu	Gly	His	Val	Phe	Asp	Ile	His	Gly	Gly	Gly	Lys	
				245					250					255		
Asp	Leu	Ile	Phe	Pro	His	His	Glu	Asn	Glu	Leu	Ala	Gln	Ser	Arg	Ala	
			260					265					270			
Ala	Tyr	Pro	Glu	Ser	Glu	Val	Lys	Cys	Trp	Met	His	Asn	Gly	Phe	Val	
		275					280					285				
Asn	Lys	Asp	Asp	Gln	Lys	Met	Ser	Lys	Ser	Asp	Lys	Asn	Phe	Phe	Thr	
	290					295					300					
Ile	Arg	Asp	Ile	Ile	Asp	Leu	Tyr	His	Pro	Met	Ala	Leu	Arg	Phe	Phe	
305					310					315					320	
Leu	Met	Arg	Thr	His	Tyr	Arg	Gly	Asp	Val	Asn	His	Ser	Asp	Lys	Ala	
				325					330					335		
Leu	Glu	Ile	Ala	Ser	Asp	Arg	Val	Tyr	Tyr	Ile	Tyr	Gln	Thr	Leu	Tyr	
			340					345					350			
Asp	Cys	Glu	Glu	Val	Leu	Ser	Gln	Tyr	Arg	Gly	Glu	Asn	Ile	Ser	Val	
		355					360					365				
Pro	Val	Pro	Val	Glu	Glu	Gln	Asp	Met	Val	Asn	Lys	His	His	Ser	Glu	
	370					375					380					

Phe Leu Glu Ser Met Ala Asp Asp Leu Arg Thr Thr Asp Val Leu Asp  
 385 390 395 400  
 Gly Phe Thr Asp Leu Leu Lys Ala Ile Asn Ser Asn Leu Asn Asp Phe  
 405 410 415  
 Lys Lys Leu Gln Gln Lys Leu Glu Gln Gln Lys Lys Lys Gln Gln Gln  
 420 425 430  
 Gln Lys Gln Gln Lys Gln Lys Gln Gln Ala Gln Lys Gln Pro Glu  
 435 440 445  
 Glu Tyr Ile Gln Ala Met Phe Ala Leu Glu Thr Glu Ile Lys Asn Lys  
 450 455 460  
 Ile Ser Ile Leu Gly Leu Met Pro Pro Ser Ser Leu Ala Glu Ala Leu  
 465 470 475 480  
 Lys Gln Leu Lys Asp Lys Ala Leu Lys Arg Ala Gly Leu Thr Glu Glu  
 485 490 495  
 Leu Leu Gln Glu Gln Ile Glu Gln Arg Thr Ala Ala Arg Lys Asn Lys  
 500 505 510  
 Gln Phe Asp Val Ser Asp Gln Ile Arg Lys Gln Leu Gly Ser Lys Gly  
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 Ile Ala Leu Met Asp Glu Pro Thr Gly Thr Val Trp Arg Pro Cys Glu  
 530 535 540  
 Pro Glu Ser Glu  
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<210> 13  
 <211> 2183  
 <212> DNA  
 <213> Glycine max

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 actccgctcc acccagactc cacgccgcca tcttcaggag caaaaacttt tctttttgcg 180  
 ccacctcgtc cccgccgttg acggcggaga agggttgctg caaatccgac gccgagtgtc 240  
 ccaccttgcc ggaggtgtgg ctgcacaaca ccatgagtag gacgaaggaa ctcttcaaac 300  
 ccaaagtgga atccaaagtg ggaatgtacg tgtgctggcg caccgcttat gatcttagcc 360  
 atattggaca cgctcgcgta tacgtcaatt tcgaccttct ttacagatac ttttaagcatt 420  
 tgggatttga agtctgttat gttcgcaatt tcaactgacg agatgacaag ataattgcta 480  
 gagcaaaagg gttaggagaa gatccaatca gtttgagctg gcgctattgt gaagagttct 540  
 gtcaagacat ggtaactctt aattgtctgt ctccctctgt ggaaccaaag gtctcagagc 600  
 acatgcccc aatcattgat atgattgaga agatccttaa taatgggtat gcctacattg 660  
 ttgatgggga tgtgtacttt aatgtagaaa aatttccaga atatgggaaa ctatctagtc 720  
 gagatctaga agataatcga gctgggtgaga gggttgcagt tgattctaga aagaaaaatc 780  
 ctgctgattt tgctcttttg aagtctgcaa agccagggga gccatttttg gagagtccct 840  
 ggggtcctgg aagacctggg tggcatattg aatgcagtgc catgagtgcg gcttatcttg 900  
 gttactcttt tgatatccat ggtggaggaa tcgaccttgt gtttcctcac catgagaatg 960  
 aaattgtcca gattgtgtgt gcatgtaaga aaagtgtatg aagtatatgg atgcacaatg 1020  
 gttttgtcac cattgactct gtgaaaatgt caaaatcttt ggggaatttt ttcaacaata 1080  
 gtcagggttat agacgtttac catocactgg ccttgagata ttttttgatg agcgcacatt 1140  
 atcgatctcc tattaactac tcaaataata agctcgaaag tgcttcagac cgtgtttttt 1200  
 atatatatga gacattacat gaatgtgaaa gctttttgaa tcagcatgat cagagggaagg 1260

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attccacccc accgatact ttggatatta ttgataagtt ccacgatgtt tttttgacct 1320
caatgtcgga tgatcttcac actccagttg tattggctgg aatgtctgat ccattaaaaat 1380
caatcaatga tttgctgcat gtcgtaagg ggaaaaaaca acaatttoga atcgaatcac 1440
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tataccgggc ttttaacccc tagagtattc atagtttcaa cgaatttgag tttcagatta 2040
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<210> 14
<211> 574
<212> PRT
<213> Glycine, max .

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Lys Met Gly Thr Val Ser Leu Leu Lys Cys Tyr Arg Pro Phe Phe Ser
          20             25             30

Met Leu Phe Pro His Ser Ala Pro Pro Arg Leu His Ala Ala Ile Phe
          35             40             45

Arg Ser Lys Asn Phe Ser Phe Cys Ala Thr Ser Ser Pro Pro Leu Thr
          50             55             60

Ala Glu Lys Gly Cys Gly Lys Ser Asp Ala Glu Cys Pro Thr Leu Pro
          65             70             75             80

Glu Val Trp Leu His Asn Thr Met Ser Arg Thr Lys Glu Leu Phe Lys
          85             90             95

Pro Lys Val Glu Ser Lys Val Gly Met Tyr Val Cys Gly Val Thr Ala
          100            105            110

Tyr Asp Leu Ser His Ile Gly His Ala Arg Val Tyr Val Asn Phe Asp
          115            120            125

Leu Leu Tyr Arg Tyr Phe Lys His Leu Gly Phe Glu Val Cys Tyr Val
          130            135            140

Arg Asn Phe Thr Asp Val Asp Asp Lys Ile Ile Ala Arg Ala Lys Glu
          145            150            155            160

Leu Gly Glu Asp Pro Ile Ser Leu Ser Trp Arg Tyr Cys Glu Glu Phe
          165            170            175

Cys Gln Asp Met Val Thr Leu Asn Cys Leu Ser Pro Ser Val Glu Pro
          180            185            190

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Lys Val Ser Glu His Met Pro Gln Ile Ile Asp Met Ile Glu Lys Ile  
 195 200 205  
 Leu Asn Asn Gly Tyr Ala Tyr Ile Val Asp Gly Asp Val Tyr Phe Asn  
 210 215 220  
 Val Glu Lys Phe Pro Glu Tyr Gly Lys Leu Ser Ser Arg Asp Leu Glu  
 225 230 235 240  
 Asp Asn Arg Ala Gly Glu Arg Val Ala Val Asp Ser Arg Lys Lys Asn  
 245 250 255  
 Pro Ala Asp Phe Ala Leu Trp Lys Ser Ala Lys Pro Gly Glu Pro Phe  
 260 265 270  
 Trp Glu Ser Pro Trp Gly Pro Gly Arg Pro Gly Trp His Ile Glu Cys  
 275 280 285  
 Ser Ala Met Ser Ala Ala Tyr Leu Gly Tyr Ser Phe Asp Ile His Gly  
 290 295 300  
 Gly Gly Ile Asp Leu Val Phe Pro His His Glu Asn Glu Ile Ala Gln  
 305 310 315 320  
 Ser Cys Ala Ala Cys Lys Lys Ser Asp Ile Ser Ile Trp Met His Asn  
 325 330 335  
 Gly Phe Val Thr Ile Asp Ser Val Lys Met Ser Lys Ser Leu Gly Asn  
 340 345 350  
 Phe Phe Thr Ile Arg Gln Val Ile Asp Val Tyr His Pro Leu Ala Leu  
 355 360 365  
 Arg Tyr Phe Leu Met Ser Ala His Tyr Arg Ser Pro Ile Asn Tyr Ser  
 370 375 380  
 Asn Ile Gln Leu Glu Ser Ala Ser Asp Arg Val Phe Tyr Ile Tyr Glu  
 385 390 395 400  
 Thr Leu His Glu Cys Glu Ser Phe Leu Asn Gln His Asp Gln Arg Lys  
 405 410 415  
 Asp Ser Thr Pro Pro Asp Thr Leu Asp Ile Ile Asp Lys Phe His Asp  
 420 425 430  
 Val Phe Leu Thr Ser Met Ser Asp Asp Leu His Thr Pro Val Val Leu  
 435 440 445  
 Ala Gly Met Ser Asp Pro Leu Lys Ser Ile Asn Asp Leu Leu His Ala  
 450 455 460  
 Arg Lys Gly Lys Lys Gln Gln Phe Arg Ile Glu Ser Leu Ser Ala Leu  
 465 470 475 480  
 Glu Lys Ser Val Arg Asp Val Leu Thr Val Leu Gly Leu Met Pro Ala  
 485 490 495  
 Ser Tyr Ser Glu Val Leu Gln Gln Leu Lys Val Lys Ala Leu Lys Arg  
 500 505 510

Ala Asn Phe Thr Glu Glu Glu Val Leu Gln Lys Ile Glu Glu Arg Ala  
515 520 525

Thr Ala Arg Met Gln Lys Glu Tyr Ala Lys Ser Asp Ala Ile Arg Lys  
530 535 540

Asp Leu Ala Val Leu Gly Ile Thr Leu Met Asp Ser Pro Asn Gly Thr  
545 550 555 560

Thr Trp Arg Pro Ala Ile Pro Leu Pro Leu Gln Glu Leu Leu  
565 570

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<211> 633  
<212> DNA  
<213> Zea mays

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cacgtcctcc accgtccgce gcacttcgcg tacacctgct taaggagtgg cgttgggtgcc 180  
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gaagccgttc ccggcccccac cgaggaggcg cctgctcctc aggcaaggaa gaaaagagta 300  
gtttctggtg tacagccaac aggatcggtt cactctggaa attatctagg ggcaattaag 360  
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atgatccagt tcaaagagaa gtctcgcaag gcg 633

<210> 16  
<211> 410  
<212> PRT  
<213> Zea mays

<400> 16  
His Gly Asp Asp Ala Met Ser Arg Ala Leu Leu Ser His Val Leu His  
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Arg Pro Pro His Phe Ala Tyr Thr Cys Leu Arg Ser Gly Val Gly Ala  
20 25 30

Arg Gly Gly Val Leu Ala Ser Gly Ile His Pro Leu Arg Arg Leu Asn  
35 40 45

Cys Ser Ala Val Glu Ala Val Pro Gly Pro Thr Glu Glu Ala Pro Ala  
50 55 60

Pro Gln Ala Arg Lys Lys Arg Val Val Ser Gly Val Gln Pro Thr Gly  
65 70 75 80

Ser Val His Leu Gly Asn Tyr Leu Gly Ala Ile Lys Asn Trp Val Ala  
85 90 95

Leu Gln Asp Ser Tyr Glu Thr Phe Phe Phe Ile Val Asp Leu His Ala  
100 105 110

Ile Thr Leu Pro Tyr Glu Ala Pro Leu Leu Ser Lys Ala Thr Arg Ser  
115 120 125

Thr Ala Ala Ile Tyr Leu Ala Cys Gly Val Asp Ser Ser Lys Ala Ser  
 130 135 140  
 Ile Phe Val Gln Ser His Val Arg Ala His Val Glu Leu Met Trp Leu  
 145 150 155 160  
 Leu Ser Ser Ser Thr Pro Ile Gly Trp Leu Asn Arg Met Ile Gln Phe  
 165 170 175  
 Lys Glu Lys Ser Arg Lys Ala Gly Asp Glu Asn Val Gly Val Ala Leu  
 180 185 190  
 Leu Thr Tyr Pro Val Leu Met Ala Ser Asp Ile Leu Leu Tyr Gln Ser  
 195 200 205  
 Asp Leu Val Pro Val Gly Glu Asp Gln Thr Gln His Leu Glu Leu Thr  
 210 215 220  
 Arg Glu Ile Ala Glu Arg Val Asn Asn Leu Tyr Gly Gly Arg Lys Trp  
 225 230 235 240  
 Lys Lys Leu Gly Gly Arg Gly Gly Leu Leu Phe Lys Val Pro Glu Ala  
 245 250 255  
 Leu Ile Pro Pro Ala Gly Ala Arg Val Met Ser Leu Thr Asp Gly Leu  
 260 265 270  
 Ser Lys Met Ser Lys Ser Ala Pro Ser Asp Gln Ser Arg Ile Asn Leu  
 275 280 285  
 Leu Asp Pro Lys Asp Val Ile Ala Asn Lys Ile Lys Arg Cys Lys Thr  
 290 295 300  
 Asp Ser Phe Pro Gly Met Glu Phe Asp Asn Pro Glu Arg Pro Glu Cys  
 305 310 315 320  
 Arg Asn Leu Leu Ser Ile Tyr Gln Ile Ile Thr Glu Lys Thr Lys Glu  
 325 330 335  
 Glu Val Val Ser Glu Cys Gln His Met Asn Trp Gly Thr Phe Lys Thr  
 340 345 350  
 Thr Leu Thr Glu Ala Leu Ile Asp His Leu Gln Pro Ile Gln Val Arg  
 355 360 365  
 Tyr Glu Glu Ile Met Ser Asp Pro Ala Tyr Leu Asp Asn Val Leu Leu  
 370 375 380  
 Glu Gly Ala Val Lys Ala Ala Glu Ile Ala Asp Ile Thr Leu Asn Asn  
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 Val Tyr Gln Ala Met Gly Phe Leu Arg Arg  
 405 410

<210> 17  
 <211> 1536  
 <212> DNA  
 <213> Glycine max



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<400> 17
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ctcactgcta cttcttcaga gactcccact ccaaccttcg tgaagaaacg agtagtgctg 180
ggggttcagc ccacgggctc aattcacctc ggaaactatt ttggcgccat caagaattgg 240
gttgccccctc agaattgtga tgatacactt ttcttcattg tggacctgca cgcgattaca 300
ttaccatatg acacccaaca attatctaag gctacaaggc caactgctgc tatttaccta 360
gcatgtggag tggatccttc aaaggcttca gtatttgtag agtctcatgt tcgggcacat 420
gtagaattga tgtggctgct aagttccaca acaccaattg gttggctgaa caaaatgata 480
caattttaaag agaaatctcg caaggcggga gatgaagaag ttgggggttg ccttttgact 540
tatcctgttc tgatggcttc tgatatactt ctatatcagt ctgattttgt ccctgttggt 600
gaagatcaaa agcagcactt ggagttgact cgtgacttgg ctgaacgggt taataattta 660
tatggaggaa gaaagtggaa gaaattagc ggttatgaca gccgaggtgg tactatattt 720
aaggttccag agccccctt acctccagcc ggagcccggga taatgtccct aactgatggc 780
ctgtccaaga tgtcaaagtc tgcaccttct gatcaatcca gaatcaatat tcttgatcct 840
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cctcttttaa cagatgcctt gattgatcat ttgcatccca ttcagggttcg ctatgaggaa 1080
atcatgtccg attcaggtta tttagatgga gttttagcac aagggtgctag aaatgcagca 1140
gatatagcag attctacact taataatatt taccaagcaa tgggattttt taagagacag 1200
tgataattga tgccaaataa attaaagatt ggcgagacgt caacttaaaa gctaacttct 1260
ggatgattca tgatgggcct caaaattttg gagtaatctt atggacatat acttgactac 1320
tggaatgga aagattattg atgcaaagcc taaagggtccc attagttctt gatgcaatgg 1380
gctttgtatc tccttcattt ttctccgagt atggtcgttg ccttcatttt atattttatt 1440
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<210> 18
<211> 400
<212> PRT
<213> Glycine max

```

```

<400> 18
Ala Arg Gly Lys Met Ser Val Ser His Phe Ala Val Leu Ser Ser Cys
 1              5              10              15

Cys Cys Pro Arg Leu Ala Pro Ser Leu Ser Arg Ala Ser Thr Leu Arg
          20              25              30

Ser Arg Ile Arg Cys Cys Thr Thr Leu Thr Ala Thr Ser Ser Glu Thr
 35              40              45

Pro Thr Pro Thr Phe Val Lys Lys Arg Val Val Ser Gly Val Gln Pro
 50              55              60

Thr Gly Ser Ile His Leu Gly Asn Tyr Phe Gly Ala Ile Lys Asn Trp
 65              70              75              80

Val Ala Leu Gln Asn Val Tyr Asp Thr Leu Phe Phe Ile Val Asp Leu
          85              90              95

His Ala Ile Thr Leu Pro Tyr Asp Thr Gln Gln Leu Ser Lys Ala Thr
 100              105              110

Arg Ser Thr Ala Ala Ile Tyr Leu Ala Cys Gly Val Asp Pro Ser Lys
 115              120              125

Ala Ser Val Phe Val Gln Ser His Val Arg Ala His Val Glu Leu Met
 130              135              140

```

Trp Leu Leu Ser Ser Thr Thr Pro Ile Gly Trp Leu Asn Lys Met Ile  
 145 150 155 160  
 Gln Phe Lys Glu Lys Ser Arg Lys Ala Gly Asp Glu Glu Val Gly Val  
 165 170 175  
 Ala Leu Leu Thr Tyr Pro Val Leu Met Ala Ser Asp Ile Leu Leu Tyr  
 180 185 190  
 Gln Ser Asp Phe Val Pro Val Gly Glu Asp Gln Lys Gln His Leu Glu  
 195 200 205  
 Leu Thr Arg Asp Leu Ala Glu Arg Val Asn Asn Leu Tyr Gly Gly Arg  
 210 215 220  
 Lys Trp Lys Lys Leu Gly Gly Tyr Asp Ser Arg Gly Gly Thr Ile Phe  
 225 230 235 240  
 Lys Val Pro Glu Pro Leu Ile Pro Pro Ala Gly Ala Arg Ile Met Ser  
 , 245 , 250 , 255  
 Leu Thr Asp Gly Leu Ser Lys Met Ser Lys Ser Ala Pro Ser Asp Gln  
 260 265 270  
 Ser Arg Ile Asn Ile Leu Asp Pro Lys Asp Leu Ile Ala Asn Lys Ile  
 275 280 285  
 Lys Arg Cys Lys Thr Asp Ser Phe Pro Gly Leu Glu Phe Asp Asn Ser  
 290 295 300  
 Glu Arg Pro Glu Cys Asn Asn Leu Val Ser Ile Tyr Gln Leu Ile Ser  
 305 310 315 320  
 Gly Lys Thr Lys Glu Glu Val Val Gln Glu Cys Gln Asn Met Asn Trp  
 325 330 335  
 Gly Thr Phe Lys Pro Leu Leu Thr Asp Ala Leu Ile Asp His Leu His  
 340 345 350  
 Pro Ile Gln Val Arg Tyr Glu Glu Ile Met Ser Asp Ser Gly Tyr Leu  
 355 360 365  
 Asp Gly Val Leu Ala Gln Gly Ala Arg Asn Ala Ala Asp Ile Ala Asp  
 370 375 380  
 Ser Thr Leu Asn Asn Ile Tyr Gln Ala Met Gly Phe Phe Lys Arg Gln  
 385 390 395 400

<210> 19

<211> 725

<212> DNA

<213> Triticum aestivum

<400> 19

ctctgtgccga attcggcagc aggcggttca ttattttaagg ttctctgaagc ccttatccct 60  
 ccagcagggg cccgtgtgat gtccttaact gatggcctct ccaagatgtc gaagtctgct 120  
 ccttcagatt tgtctcgcat taaccttctt gacccaaatg atgtgattgt gaacaaaatc 180  
 aaacgctgca aaactgactc gtcacctggc ttggaattcg acaaccagaga gaggcggaa 240  
 tgcaaaaatc ttctctcagt ctaccagatc atcactggaa aaacgaaaga ggaagttggt 300

agtgaatgcc aagatatgaa ctgggggaag ttcaagggtta cccttacgga tgccttaatt 360  
 gatcatctgc aacctattca gggtcgatac gaggagatca tgtctgatcc aggttatttg 420  
 gacaatgttc tgctaaatgg ggcagggaaa gcttctgaga tagcagacgc caccctcaac 480  
 aacgtctacc aagccatggg tttcttgccg agatagcata tgtagaacat tttttataac 540  
 tgcacaatgc tagttttgca cttgttggcc tttctgctag tggtagctat aagcgttttg 600  
 tttgatatgc ttggattagc cttttgttcc tggttattat ggacactgtt aatagggtatt 660  
 aaaaggatta tttactgaaa aaaaaaaaaa aaaaaaaaaa attaaaaggg ggcgcgcgta 720  
 ccata 725

<210> 20  
 <211> 171  
 <212> PRT  
 <213> Triticum aestivum

<400> 20  
 Leu Val Pro Asn Ser Ala Arg Gly Gly Ser Leu Phe Lys Val Pro Glu  
 1 5 10 15  
 Ala Leu Ile Pro Pro Ala Gly Ala Arg Val Met Ser Leu Thr Asp Gly  
 20 25 30  
 Leu Ser Lys Met Ser Lys Ser Ala Pro Ser Asp Leu Ser Arg Ile Asn  
 35 40 45  
 Leu Leu Asp Pro Asn Asp Val Ile Val Asn Lys Ile Lys Arg Cys Lys  
 50 55 60  
 Thr Asp Ser Leu Pro Gly Leu Glu Phe Asp Asn Pro Glu Arg Pro Glu  
 65 70 75 80  
 Cys Lys Asn Leu Leu Ser Val Tyr Gln Ile Ile Thr Gly Lys Thr Lys  
 85 90 95  
 Glu Glu Val Val Ser Glu Cys Gln Asp Met Asn Trp Gly Thr Phe Lys  
 100 105 110  
 Val Thr Leu Thr Asp Ala Leu Ile Asp His Leu Gln Pro Ile Gln Val  
 115 120 125  
 Arg Tyr Glu Glu Ile Met Ser Asp Pro Gly Tyr Leu Asp Asn Val Leu  
 130 135 140  
 Leu Asn Gly Ala Gly Lys Ala Ser Glu Ile Ala Asp Ala Thr Leu Asn  
 145 150 155 160  
 Asn Val Tyr Gln Ala Met Gly Phe Leu Arg Arg  
 165 170

<210> 21  
 <211> 1062  
 <212> DNA  
 <213> Zea mays

<400> 21  
 gcacgaggga catcacgctg ctggatttcc tgagagaggt gggccggttt gcacgcgtgg 60  
 gtacaatgat cgccaaggag agcgtcaaga agcgtcttgc gtcggaagac gggatgagct 120  
 acaccgagtt tacctaccag ctgctgcagg gctacgactt cctttacatg ttcaagaata 180  
 tgggtgtcaa tgtgcagatc gggggcagcg atcagtgagg gaacatcaca gcggaactg 240  
 agttgatcag aaaaatcttg caggttgaag gggcgcagtg actcacattc ccacttctgc 300  
 tgaagagcga cggtagcaaa tttggaaaga cggaggatgg ggcaatctgg ctctcttcga 360

```

agatgctttc tccttacaag ttctatcagt acttctttgc ggtgccagac atcgatgtca 420
tcaggtttat gaagatcctg acgttcctga gcttggatga gattctggag ctagaagact 480
cgatgaagaa gcctggctat gtgccaacaa ctgttcagaa gaggcttgca gaagaggatga 540
cgcgatttgt tcatggcgag gagggattgg aggaggcatt gaaggcaacc gaggccttga 600
gacctggtgc tcagacacaa ttggatgcac aaacaattga ggggatagca gatgatgtgc 660
cttcatgctc ttttagcttat gatcaagtgt tcaagtctcc acttattgat ttggctgttt 720
ccacaggttt gctcactagt aagtcagcag ttaagcggct tattaagcaa ggtggtctgt 780
acttgaataa cgtgaggatt gatagtgagg ataagctggt tgaggaaggt gatatagttg 840
atgggaaggt gctcttggtg tctgctggaa agaagaacaa gatggttggt aggatatctt 900
gactactctt atttgttctt tataacttat tttagccatt gaggagaaaa gtaacggtgt 960
tgtgtcttca aaactcaaat gagctgtcta tgagcataca gattgttata ttggagaggt 1020
tgaacacacc tttttttttg ctctaaaaaa aaaaaaaaaa aa 1062

```

```

<210> 22
<211> 299
<212> PRT
<213> Zea mays

```

```

<400> 22

```

```

Thr Arg Asp Ile Thr Leu Leu Asp Phe Leu Arg Glu Val Gly Arg Phe
  1           ,   5   ,           10   ,           15

```

```

Ala Arg Val Gly Thr Met Ile Ala Lys Glu Ser Val Lys Lys Arg Leu
          20           25           30

```

```

Ala Ser Glu Asp Gly Met Ser Tyr Thr Glu Phe Thr Tyr Gln Leu Leu
          35           40           45

```

```

Gln Gly Tyr Asp Phe Leu Tyr Met Phe Lys Asn Met Gly Val Asn Val
          50           55           60

```

```

Gln Ile Gly Gly Ser Asp Gln Trp Gly Asn Ile Thr Ala Gly Thr Glu
          65           70           75           80

```

```

Leu Ile Arg Lys Ile Leu Gln Val Glu Gly Ala His Gly Leu Thr Phe
          85           90           95

```

```

Pro Leu Leu Leu Lys Ser Asp Gly Thr Lys Phe Gly Lys Thr Glu Asp
          100          105          110

```

```

Gly Ala Ile Trp Leu Ser Ser Lys Met Leu Ser Pro Tyr Lys Phe Tyr
          115          120          125

```

```

Gln Tyr Phe Phe Ala Val Pro Asp Ile Asp Val Ile Arg Phe Met Lys
          130          135          140

```

```

Ile Leu Thr Phe Leu Ser Leu Asp Glu Ile Leu Glu Leu Glu Asp Ser
          145          150          155          160

```

```

Met Lys Lys Pro Gly Tyr Val Pro Asn Thr Val Gln Lys Arg Leu Ala
          165          170          175

```

```

Glu Glu Val Thr Arg Phe Val His Gly Glu Glu Gly Leu Glu Glu Ala
          180          185          190

```

```

Leu Lys Ala Thr Glu Ala Leu Arg Pro Gly Ala Gln Thr Gln Leu Asp
          195          200          205

```

```

Ala Gln Thr Ile Glu Gly Ile Ala Asp Asp Val Pro Ser Cys Ser Leu
          210          215          220

```

Ala Tyr Asp Gln Val Phe Lys Ser Pro Leu Ile Asp Leu Ala Val Ser  
 225 230 235 240  
 Thr Gly Leu Leu Thr Ser Lys Ser Ala Val Lys Arg Leu Ile Lys Gln  
 245 250 255  
 Gly Gly Leu Tyr Leu Asn Asn Val Arg Ile Asp Ser Glu Asp Lys Leu  
 260 265 270  
 Val Glu Glu Gly Asp Ile Val Asp Gly Lys Val Leu Leu Leu Ser Ala  
 275 280 285  
 Gly Lys Lys Asn Lys Met Val Val Arg Ile Ser  
 290 295  
 <210> 23  
 <211> 346  
 <212> PRT  
 <213> Drosophila melanogaster  
 <400> 23  
 Met Val Asp Lys Val Ala Asn Gly Val Ser Lys Lys Gly Ala Lys Lys  
 1 5 10 15  
 Ala Lys Ala Ala Lys Lys Ala Lys Ala Asn Ala Ser Thr Ala Ala Ala  
 20 25 30  
 Asn Asn Ser Gly Gly Asp Ser Ala Asp His Ala Ala Gly Arg Tyr Gly  
 35 40 45  
 Ser Met Ser Lys Asp Lys Arg Ser Arg Asn Val Val Ser Ser Gly Val  
 50 55 60  
 Gly Lys Gly Val Trp Val Arg Gly Arg Val His Thr Ser Arg Ala Lys  
 65 70 75 80  
 Gly Lys Cys Arg Ser Ser Thr Val Cys Ala Val Gly Asp Val Ser Lys  
 85 90 95  
 Met Val Lys Ala Gly Asn Lys Ser Asp Ala Lys Val Ala Val Ser Ser  
 100 105 110  
 Lys Ser Cys Thr Ser Ser Val Val Ser Ala Lys Ala Asp Ala Ser Arg  
 115 120 125  
 Asn Ala Asp Asp Ala Gly Asn Arg Val Asn Asp Thr Arg Asp Asn Arg  
 130 135 140  
 Val Asp Arg Thr Ala Asn Ala Arg Ala Gly Val Cys Arg Arg Asp Thr  
 145 150 155 160  
 Gly Thr His Thr Lys Ser Ala Ala Ser Gly Gly Ala Asn Val Thr Val  
 165 170 175  
 Ser Tyr Lys Asp Ser Ala Tyr Ala Ser Tyr Lys Met Ala Ala Ala Asp  
 180 185 190  
 Asp Lys Val Tyr Thr Val Gly Ala Val Arg Ala Asp Ser Asn Thr His  
 195 200 205

Arg His Thr Val Gly Asp Met Ala Lys Tyr His Tyr His Val His Thr  
 210 215 220  
 Gly Asn Thr Thr Ser Lys Gly Arg Asp Lys Tyr Ala Lys Ser Val Gly  
 225 230 235 240  
 Tyr Lys Val Asp Ala Lys Ala Asp Gly Val Ala Met Arg Ala Gly Val  
 245 250 255  
 Thr Gly Asp Asp Ser Thr Asn Lys Gly Arg Val Lys Ala Lys Tyr Asp  
 260 265 270  
 Thr Asp Tyr Asp Lys Ala Arg Tyr Thr Met Asp Asn Asn Val Tyr Ser  
 275 280 285  
 Asn Ser Tyr Asp Met Met Arg Gly Ser Gly Ala Arg His Asp Tyr Arg  
 290 295 300  
 Ala Lys His His Gly Asp Thr Ser Lys Ala Ala Tyr Ser Arg Tyr Gly  
 305 310 315 320  
 Cys His Ala Gly Gly Gly Gly Met Arg Val Val Met Tyr Gly Asp Asn  
 325 330 335  
 Arg Lys Thr Ser Met Arg Asp Lys Arg Thr  
 340 345  
 <210> 24  
 <211> 501  
 <212> PRT  
 <213> Rattus norvegicus  
 <400> 24  
 Met Pro Ser Ala Asn Ala Ser Arg Lys Gly Gln Glu Lys Pro Arg Glu  
 1 5 10 15  
 Ile Val Asp Ala Ala Glu Asp Tyr Ala Lys Glu Arg Tyr Gly Val Ser  
 20 25 30  
 Ser Met Ile Gln Ser Gln Glu Lys Pro Asp Arg Val Leu Val Arg Val  
 35 40 45  
 Lys Asp Leu Thr Val Gln Lys Ala Asp Glu Val Val Trp Val Arg Ala  
 50 55 60  
 Arg Val His Thr Ser Arg Ala Lys Gly Lys Gln Cys Phe Leu Val Leu  
 65 70 75 80  
 Arg Gln Gln Gln Phe Asn Val Gln Ala Leu Val Ala Val Gly Asp His  
 85 90 95  
 Ala Ser Lys Gln Met Val Lys Phe Ala Ala Asn Ile Asn Lys Glu Ser  
 100 105 110  
 Ile Ile Asp Val Glu Gly Ile Val Arg Lys Val Asn Gln Lys Ile Gly  
 115 120 125  
 Ser Cys Thr Gln Gln Asp Val Glu Leu His Val Gln Lys Ile Tyr Val  
 130 135 140

Ile Ser Leu Ala Glu Pro Arg Leu Pro Leu Gln Leu Asp Asp Ala Ile  
 145 150 155 160  
 Arg Pro Glu Val Glu Gly Glu Glu Asp Gly Arg Ala Thr Val Asn Gln  
 165 170 175  
 Asp Thr Arg Leu Asp Asn Arg Ile Ile Asp Leu Arg Thr Ser Thr Ser  
 180 185 190  
 Gln Ala Ile Phe His Leu Gln Ser Gly Ile Cys His Leu Phe Arg Glu  
 195 200 205  
 Thr Leu Ile Asn Lys Gly Phe Val Glu Ile Gln Thr Pro Lys Ile Ile  
 210 215 220  
 Ser Ala Ala Ser Glu Gly Gly Ala Asn Val Phe Thr Val Ser Tyr Phe  
 225 230 235 240  
 Lys Ser Asn Ala Tyr Leu Ala Gln Ser Pro Gln Leu Tyr Lys Gln Met  
 245 250 255  
 Cys Ile Cys Ala Asp Phe Glu Lys Val Phe Cys Ile Gly Pro Val Phe  
 260 265 270  
 Arg Ala Glu Asp Ser Asn Thr His Arg His Leu Thr Glu Phe Val Gly  
 275 280 285  
 Leu Asp Ile Glu Met Ala Phe Asn Tyr His Tyr His Glu Val Val Glu  
 290 295 300  
 Glu Ile Ala Asp Thr Leu Val Gln Ile Phe Lys Gly Leu Gln Glu Arg  
 305 310 315 320  
 Phe Gln Thr Glu Ile Gln Thr Val Asn Lys Gln Phe Pro Cys Glu Pro  
 325 330 335  
 Phe Lys Phe Leu Glu Pro Thr Leu Arg Leu Glu Tyr Cys Glu Ala Leu  
 340 345 350  
 Ala Met Leu Arg Glu Ala Gly Val Glu Met Asp Asp Glu Glu Asp Leu  
 355 360 365  
 Ser Thr Pro Asn Glu Lys Leu Leu Gly Arg Leu Val Lys Glu Lys Tyr  
 370 375 380  
 Asp Thr Asp Phe Tyr Val Leu Asp Lys Tyr Pro Leu Ala Val Arg Pro  
 385 390 395 400  
 Phe Tyr Thr Met Pro Asp Pro Arg Asn Pro Lys Gln Ser Asn Ser Tyr  
 405 410 415  
 Asp Met Phe Met Arg Gly Glu Glu Ile Leu Ser Gly Ala Gln Arg Ile  
 420 425 430  
 His Asp Pro Gln Leu Leu Thr Glu Arg Ala Leu His His Gly Ile Asp  
 435 440 445  
 Leu Glu Lys Ile Lys Ala Tyr Ile Asp Ser Phe Arg Phe Gly Ala Pro  
 450 455 460

Pro His Ala Gly Gly Gly Ile Gly Leu Glu Arg Val Thr Met Leu Phe  
 465 470 475 480

Leu Gly Leu His Asn Val Arg Gln Thr Ser Met Phe Pro Arg Asp Pro  
 485 490 495

Lys Arg Leu Thr Pro  
 500

<210> 25

<211> 500

<212> PRT

<213> Homo sapiens

<400> 25

Met Pro Ser Ala Thr Gln Arg Lys Ser Gln Glu Lys Pro Arg Glu Ile  
 1 5 10 15

Met Asp Ala Ala Glu Asp Tyr Ala Lys Glu Arg Tyr Gly Ile Ser Ser  
 20 25 30

Met Ile Gln Ser Gln Glu Lys Pro Asp Arg Val Leu Val Arg Val Arg  
 35 40 45

Asp Leu Thr Ile Gln Lys Ala Asp Glu Val Val Trp Val Arg Ala Arg  
 50 55 60

Val His Thr Ser Arg Ala Lys Gly Lys Gln Cys Phe Leu Val Leu Arg  
 65 70 75 80

Gln Gln Gln Phe Asn Val Gln Ala Leu Val Ala Val Gly Asp His Ala  
 85 90 95

Ser Lys Gln Met Val Lys Phe Ala Ala Asn Ile Asn Lys Glu Ser Ile  
 100 105 110

Val Asp Val Glu Gly Val Val Arg Lys Val Asn Gln Lys Ile Gly Ser  
 115 120 125

Cys Thr Gln Gln Asp Val Glu Leu His Val Gln Lys Ile Tyr Val Ile  
 130 135 140

Ser Leu Ala Glu Pro Arg Leu Pro Leu Gln Leu Asp Asp Ala Val Arg  
 145 150 155 160

Pro Glu Gln Glu Gly Glu Glu Glu Gly Arg Ala Thr Val Asn Gln Asp  
 165 170 175

Thr Arg Leu Asp Asn Arg Val Ile Asp Leu Arg Thr Ser Thr Ser Gln  
 180 185 190

Ala Val Phe Arg Leu Gln Ser Gly Ile Cys His Leu Phe Arg Glu Thr  
 195 200 205

Leu Ile Asn Lys Gly Phe Val Glu Ile Gln Thr Pro Lys Ile Ile Ser  
 210 215 220

Ala Ala Ser Glu Gly Gly Ala Asn Val Phe Thr Val Ser Tyr Phe Lys  
 225 230 235 240



Asn Asn Ala Tyr Leu Ala Gln Ser Pro Gln Leu Tyr Lys Gln Met Cys  
 245 250 255  
 Ile Cys Ala Asp Phe Glu Lys Val Phe Ser Ile Gly Pro Val Phe Arg  
 260 265 270  
 Ala Glu Asp Ser Asn Thr His Arg His Leu Thr Glu Phe Val Gly Leu  
 275 280 285  
 Asp Ile Glu Met Ala Phe Asn Tyr His Tyr His Glu Val Met Glu Glu  
 290 295 300  
 Ile Ala Asp Thr Met Val Gln Ile Phe Lys Gly Leu Gln Glu Arg Phe  
 305 310 315 320  
 Gln Thr Glu Ile Gln Thr Val Asn Lys Gln Phe Pro Cys Glu Pro Phe  
 325 330 335  
 Lys Phe Leu Glu Pro Thr Leu Arg Leu Glu Tyr Cys Glu Ala Leu Ala  
 340 345 350  
 Met Leu Arg Glu Ala Gly Val Glu Met Gly Asp Glu Asp Asp Leu Ser  
 355 360 365  
 Thr Pro Asn Glu Lys Leu Leu Gly His Leu Val Lys Glu Lys Tyr Asp  
 370 375 380  
 Thr Asp Phe Tyr Ile Leu Asp Lys Tyr Pro Leu Ala Val Arg Pro Phe  
 385 390 395 400  
 Tyr Thr Met Pro Asp Pro Arg Asn Pro Lys Gln Ser Lys Ser Tyr Asp  
 405 410 415  
 Met Phe Met Arg Gly Glu Glu Ile Leu Ser Gly Ala Gln Arg Ile His  
 420 425 430  
 Asp Pro Gln Leu Leu Thr Glu Arg Ala Leu His His Gly Asn Asp Leu  
 435 440 445  
 Glu Lys Ile Lys Ala Tyr Ile Asp Ser Phe Arg Phe Gly Ala Pro Pro  
 450 455 460  
 His Ala Gly Gly Gly Ile Gly Leu Glu Arg Val Thr Met Leu Phe Leu  
 465 470 475 480  
 Gly Leu His Asn Val Arg Gln Thr Ser Met Phe Pro Arg Asp Pro Lys  
 485 490 495  
 Arg Leu Thr Pro  
 500

<210> 26  
 <211> 459  
 <212> PRT  
 <213> Haemophilus influenzae Rd

<400> 26  
 Met Leu Lys Ile Phe Asn Thr Leu Thr Arg Glu Lys Glu Ile Phe Lys  
 1 5 10 15

Pro Ile His Glu Asn Lys Val Gly Met Tyr Val Cys Gly Val Thr Val  
 20 25 30  
 Tyr Asp Leu Cys His Ile Gly His Gly Arg Thr Phe Val Cys Phe Asp  
 35 40 45  
 Val Ile Ala Arg Tyr Leu Arg Ser Leu Gly Tyr Asp Leu Thr Tyr Val  
 50 55 60  
 Arg Asn Ile Thr Asp Val Asp Asp Lys Ile Ile Lys Arg Ala Leu Glu  
 65 70 75 80  
 Asn Lys Glu Thr Cys Asp Gln Leu Val Asp Arg Met Val Gln Glu Met  
 85 90 95  
 Tyr Lys Asp Phe Asp Ala Leu Asn Val Leu Arg Pro Asp Phe Glu Pro  
 100 105 110  
 Arg Ala Thr His His Ile Pro Glu Ile Ile Glu Ile Val Glu Lys Leu  
 115 120 125  
 Ile Lys Arg Gly His Ala Tyr Val Ala Asp Asn Gly Asp Val Met Phe  
 130 135 140  
 Asp Val Glu Ser Phe Lys Glu Tyr Gly Lys Leu Ser Arg Gln Asp Leu  
 145 150 155 160  
 Glu Gln Leu Gln Ala Gly Ala Arg Ile Glu Ile Asn Glu Ile Lys Lys  
 165 170 175  
 Asn Pro Met Asp Phe Val Leu Trp Lys Met Ser Lys Glu Asn Glu Pro  
 180 185 190  
 Ser Trp Ala Ser Pro Trp Gly Ala Gly Arg Pro Gly Trp His Ile Glu  
 195 200 205  
 Cys Ser Ala Met Asn Cys Lys Gln Leu Gly Glu Tyr Phe Asp Ile His  
 210 215 220  
 Gly Gly Gly Ser Asp Leu Met Phe Pro His His Glu Asn Glu Ile Ala  
 225 230 235 240  
 Gln Ser Cys Cys Ala His Gly Gly Gln Tyr Val Asn Tyr Trp Ile His  
 245 250 255  
 Ser Gly Met Ile Met Val Asp Lys Glu Lys Met Ser Lys Ser Leu Gly  
 260 265 270  
 Asn Phe Phe Thr Ile Arg Asp Val Leu Asn His Tyr Asn Ala Glu Ala  
 275 280 285  
 Val Arg Tyr Phe Leu Leu Thr Ala His Tyr Arg Ser Gln Leu Asn Tyr  
 290 295 300  
 Ser Glu Glu Asn Leu Asn Leu Ala Gln Gly Ala Leu Glu Arg Leu Tyr  
 305 310 315 320  
 Thr Ala Leu Arg Gly Thr Asp Gln Ser Ala Val Ala Phe Gly Gly Glu  
 325 330 335

Asn Phe Val Ala Thr Phe Arg Glu Ala Met Asp Asp Asp Phe Asn Thr  
 340 345 350  
 Pro Asn Ala Leu Ser Val Leu Phe Glu Met Ala Arg Glu Ile Asn Lys  
 355 360 365  
 Leu Lys Thr Glu Asp Val Glu Lys Ala Asn Gly Leu Ala Ala Arg Leu  
 370 375 380  
 Arg Glu Leu Gly Ala Ile Leu Gly Leu Leu Gln Gln Glu Pro Glu Lys  
 385 390 395 400  
 Phe Leu Gln Ala Gly Ser Asn Asp Asp Glu Val Ala Lys Ile Glu Ala  
 405 410 415  
 Leu Ile Lys Gln Arg Asn Glu Ala Arg Thr Ala Lys Asp Trp Ser Ala  
 420 425 430  
 Ala Asp Ser Ala Arg Asn Glu Leu Thr Ala Met Gly Ile Val Leu Glu  
 435 440 445  
 Asp Gly Pro Asn Gly Thr Thr Trp Arg Lys Gln  
 450 455  
 <210> 27  
 <211> 461  
 <212> PRT  
 <213> Escherichia coli  
 <400> 27  
 Met Leu Lys Ile Phe Asn Thr Leu Thr Arg Gln Lys Glu Glu Phe Lys  
 1 5 10 15  
 Pro Ile His Ala Gly Glu Val Gly Met Tyr Val Cys Gly Ile Thr Val  
 20 25 30  
 Tyr Asp Leu Cys His Ile Gly His Gly Arg Thr Phe Val Ala Phe Asp  
 35 40 45  
 Val Val Ala Arg Tyr Leu Arg Phe Leu Gly Tyr Lys Leu Lys Tyr Val  
 50 55 60  
 Arg Asn Ile Thr Asp Ile Asp Asp Lys Ile Ile Lys Arg Ala Asn Glu  
 65 70 75 80  
 Asn Gly Glu Ser Phe Val Ala Met Val Asp Arg Met Ile Ala Glu Met  
 85 90 95  
 His Lys Asp Phe Asp Ala Leu Asn Ile Leu Arg Pro Asp Met Glu Pro  
 100 105 110  
 Arg Ala Thr His His Ile Ala Glu Ile Ile Glu Leu Thr Glu Gln Leu  
 115 120 125  
 Ile Ala Lys Gly His Ala Tyr Val Ala Asp Asn Gly Asp Val Met Phe  
 130 135 140  
 Asp Val Pro Thr Asp Pro Thr Tyr Gly Val Leu Ser Arg Gln Asp Leu  
 145 150 155 160

Asp Gln Leu Gln Ala Gly Ala Arg Val Asp Val Val Asp Asp Lys Arg  
 165 170 175  
 Asn Pro Met Asp Phe Val Leu Trp Lys Met Ser Lys Glu Gly Glu Pro  
 180 185 190  
 Ser Trp Pro Ser Pro Trp Gly Ala Gly Arg Pro Gly Trp His Ile Glu  
 195 200 205  
 Cys Ser Ala Met Asn Cys Lys Gln Leu Gly Asn His Phe Asp Ile His  
 210 215 220  
 Gly Gly Gly Ser Asp Leu Met Phe Pro His His Glu Asn Glu Ile Ala  
 225 230 235 240  
 Gln Ser Thr Cys Ala His Asp Gly Gln Tyr Val Asn Tyr Trp Met His  
 245 250 255  
 Ser Gly Met Val Met Val Asp Arg Glu Lys Met Ser Lys Ser Leu Gly  
 260 265 270  
 Asn Phe Phe Thr Val Arg Asp Val Leu Lys Tyr Tyr Asp Ala Glu Thr  
 275 280 285  
 Val Arg Tyr Phe Leu Met Ser Gly His Tyr Arg Ser Gln Leu Asn Tyr  
 290 295 300  
 Ser Glu Glu Asn Leu Lys Gln Ala Arg Ala Val Glu Arg Leu Tyr  
 305 310 315 320  
 Thr Ala Leu Arg Gly Thr Asp Lys Thr Val Ala Pro Ala Gly Gly Glu  
 325 330 335  
 Ala Phe Glu Ala Arg Phe Ile Glu Ala Met Asp Asp Asp Phe Asn Thr  
 340 345 350  
 Pro Glu Ala Tyr Ser Val Leu Phe Asp Met Ala Arg Glu Val Asn Arg  
 355 360 365  
 Leu Lys Ala Glu Asp Met Ala Ala Ala Asn Ala Met Ala Ser His Leu  
 370 375 380  
 Arg Lys Leu Ser Ala Val Leu Gly Leu Leu Glu Gln Glu Pro Glu Ala  
 385 390 395 400  
 Phe Leu Gln Ser Gly Ala Gln Ala Asp Asp Ser Glu Val Ala Glu Ile  
 405 410 415  
 Glu Ala Leu Ile Gln Gln Arg Leu Asp Ala Arg Lys Ala Lys Asp Trp  
 420 425 430  
 Ala Ala Ala Asp Ala Ala Arg Asp Arg Leu Asn Glu Met Gly Ile Val  
 435 440 445  
 Leu Glu Asp Gly Pro Gln Gly Thr Thr Trp Arg Arg Lys  
 450 455 460

<210> 28  
 <211> 377

<212> PRT  
 <213> Synechocystis sp.

<400> 28

Met	Lys	Asn	Cys	Glu	Asn	Asp	His	Arg	Phe	Thr	Thr	Val	Ser	Ser	Gly	1	5	10	15
Lys	Ala	Trp	Gly	Gln	Leu	His	Arg	Phe	Pro	Ser	Leu	Ile	Lys	Phe	Asn	20	25	30	
Phe	Ala	His	Arg	Ser	Thr	Thr	Ala	Met	Asp	Lys	Pro	Arg	Ile	Leu	Ser	35	40	45	
Gly	Val	Gln	Pro	Thr	Gly	Asn	Leu	His	Leu	Gly	Asn	Tyr	Leu	Gly	Ala	50	55	60	
Ile	Arg	Ser	Trp	Val	Glu	Gln	Gln	Gln	His	Tyr	Asp	Asn	Phe	Phe	Cys	65	70	75	80
Val	Val	Asp	Leu	His	Ala	Ile	Thr	Val	Pro	His	Asn	Pro	Gln	Thr	Leu	85	90	95	
Ala	Gln	Asp	Thr	Leu	Thr	Ile	Ala	Ala	Leu	Tyr	Leu	Ala	Cys	Gly	Ile	100	105	110	
Asp	Leu	Gln	Tyr	Ser	Thr	Ile	Phe	Val	Gln	Ser	His	Val	Ala	Ala	His	115	120	125	
Ser	Glu	Leu	Ala	Trp	Leu	Leu	Asn	Cys	Val	Thr	Pro	Leu	Asn	Trp	Leu	130	135	140	
Glu	Arg	Met	Ile	Gln	Phe	Lys	Glu	Lys	Ala	Val	Lys	Gln	Gly	Glu	Asn	145	150	155	160
Val	Ser	Val	Gly	Leu	Leu	Asp	Tyr	Pro	Val	Leu	Met	Ala	Ala	Asp	Ile	165	170	175	
Leu	Leu	Tyr	Asp	Ala	Asp	Lys	Val	Pro	Val	Gly	Glu	Asp	Gln	Lys	Gln	180	185	190	
His	Leu	Glu	Leu	Thr	Arg	Asp	Ile	Val	Ile	Arg	Ile	Asn	Asp	Lys	Phe	195	200	205	
Gly	Arg	Glu	Asp	Ala	Pro	Val	Leu	Lys	Leu	Pro	Glu	Pro	Leu	Ile	Arg	210	215	220	
Lys	Glu	Gly	Ala	Arg	Val	Met	Ser	Leu	Ala	Asp	Gly	Thr	Lys	Lys	Met	225	230	235	240
Ser	Lys	Ser	Asp	Glu	Ser	Glu	Leu	Ser	Arg	Ile	Asn	Leu	Leu	Asp	Pro	245	250	255	
Pro	Glu	Met	Ile	Lys	Lys	Lys	Val	Lys	Lys	Cys	Lys	Thr	Asp	Pro	Gln	260	265	270	
Arg	Gly	Leu	Trp	Phe	Asp	Asp	Pro	Glu	Arg	Pro	Glu	Cys	His	Asn	Leu	275	280	285	
Leu	Thr	Leu	Tyr	Thr	Leu	Leu	Ser	Asn	Gln	Thr	Lys	Glu	Ala	Val	Ala	290	295	300	

Gln Glu Cys Ala Glu Met Gly Trp Gly Gln Phe Lys Pro Leu Leu Thr  
 305 310 315 320  
 Glu Thr Ala Ile Ala Ala Leu Glu Pro Ile Gln Ala Lys Tyr Ala Glu  
 325 330 335  
 Ile Leu Ala Asp Arg Gly Glu Leu Asp Arg Ile Ile Gln Ala Gly Asn  
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 Ala Leu Gly Phe Leu Ala Pro Pro Tyr  
 370 375  
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 Met Asp Leu Leu Ala Glu Leu Gln Trp Arg Gly Leu Val Asn Gln Thr  
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 Thr Asp Glu Asp Gly Leu Arg Lys Leu Leu Asn Glu Glu Arg Val Thr  
 20 25 30  
 Leu Tyr Cys Gly Phe Asp Pro Thr Ala Asp Ser Leu His Ile Gly Asn  
 35 40 45  
 Leu Ala Ala Ile Leu Thr Leu Arg Arg Phe Gln Gln Ala Gly His Arg  
 50 55 60  
 Pro Ile Ala Leu Val Gly Gly Ala Thr Gly Leu Ile Gly Asp Pro Ser  
 65 70 75 80  
 Gly Lys Lys Ser Glu Arg Thr Leu Asn Ala Lys Glu Thr Val Glu Ala  
 85 90 95  
 Trp Ser Ala Arg Ile Lys Glu Gln Leu Gly Arg Phe Leu Asp Phe Glu  
 100 105 110  
 Ala Asp Gly Asn Pro Ala Lys Ile Lys Asn Asn Tyr Asp Trp Ile Gly  
 115 120 125  
 Pro Leu Asp Val Ile Thr Phe Leu Arg Asp Val Gly Lys His Phe Ser  
 130 135 140  
 Val Asn Tyr Met Met Ala Lys Glu Ser Val Gln Ser Arg Ile Glu Thr  
 145 150 155 160  
 Gly Ile Ser Phe Thr Glu Phe Ser Tyr Met Met Leu Gln Ala Tyr Asp  
 165 170 175  
 Phe Leu Arg Leu Tyr Glu Thr Glu Gly Cys Arg Leu Gln Ile Gly Gly  
 180 185 190  
 Ser Asp Gln Trp Gly Asn Ile Thr Ala Gly Leu Glu Leu Ile Arg Lys  
 195 200 205

Thr Lys Gly Glu Ala Arg Ala Phe Gly Leu Thr Ile Pro Leu Val Thr  
 210 215 220  
 Lys Ala Asp Gly Thr Lys Phe Gly Lys Thr Glu Ser Gly Thr Ile Trp  
 225 230 235 240  
 Leu Asp Lys Glu Lys Thr Ser Pro Tyr Glu Phe Tyr Gln Phe Trp Ile  
 245 250 255  
 Asn Thr Asp Asp Arg Asp Val Ile Arg Tyr Leu Lys Tyr Phe Thr Phe  
 260 265 270  
 Leu Ser Lys Glu Glu Ile Glu Ala Leu Glu Gln Glu Leu Arg Glu Ala  
 275 280 285  
 Pro Glu Lys Arg Ala Ala Gln Lys Ala Leu Ala Glu Glu Val Thr Lys  
 290 295 300  
 Leu Val His Gly Glu Glu Ala Leu Arg Gln Ala Ile Arg Ile Ser Glu  
 305 310 315 320  
 Ala Leu Phe Ser Gly Asp Ile Ala Asn Leu Thr Ala Ala Glu Ile Glu  
 325 330 335  
 Gln Gly Phe Lys Asp Val Pro Ser Phe Val His Glu Gly Gly Asp Val  
 340 345 350  
 Pro Leu Val Glu Leu Leu Val Ser Ala Gly Ile Ser Pro Ser Lys Arg  
 355 360 365  
 Gln Ala Arg Glu Asp Ile Gln Asn Gly Ala Ile Tyr Val Asn Gly Glu  
 370 375 380  
 Arg Leu Gln Asp Val Gly Ala Ile Leu Thr Ala Glu His Arg Leu Glu  
 385 390 395 400  
 Gly Arg Phe Thr Val Ile Arg Arg Gly Lys Lys Lys Tyr Tyr Leu Ile  
 405 410 415  
 Arg Tyr Ala